Please replace the paragraph beginning at page 23, line 4 with the following rewritten paragraph:

FIG. 6A-6B is a flow chart illustrating the steps S114 and S132 of FIG. 4 for delivering ventricular pace pulses triggered by a ventricular sense event in step S108 during the time-out of an AV delay, or in step S124 during time-out of the V-A escape interval. It may be noted that these steps are optional, and may not be provided in some devices, or alternatively, may be designed to be programmably enabled/disabled. As noted above, the sensing of R-waves in the RV and LV can be accomplished by employing several RV-SENSE and LV-SENSE sensing axes or vectors and the trans-ventricular sensing vector. The selected vectors may include the bipolar RV-SENSE vector (RV sense electrodes 38 and 40), a unipolar RV-SENSE vector (RV tip sense electrode 40 and IND_CAN electrode 20), a unipolar LV-SENSE vector (LV sense electrode 50 and IND_CAN electrode 20), and a trans-ventricular, combined RV-SENSE and LV-SENSE vector (RV tip sense electrode 40 and LV sense electrode 50). The selection of the sensing vectors would depend upon heart condition and the selection of the pace pulse pathways.

REMARKS

Please enter the amendment set forth above to the Specification of the subject case prior to issuing a first action on the merits. This amendment corrects formality issues only, and no new matter is entered. If there are any questions or concerns regarding the amendment, a call to the undersigned is encouraged and welcomed.

REFERENCE TO MARKED-UP VERSION OF CHANGES

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned attorney to attend to these matters.

Respectfully submitted,

Dwight H. Warkentin,
By his attorneys,

Date: February 25, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The specification has been amended as follows:

The paragraph beginning at page 11, line 15 has been amended as follows:

FIG 2 is a schematic representation of an implanted, three channel cardiac pacemaker of the above noted types for restoring AV synchronous contractions of the atrial and ventricular chambers and simultaneous or sequential pacing of the right and left ventricles. The pacemaker IPG 14 is implanted subcutaneously in a patient's body between the skin and the ribs. Three endocardial leads 16, 32 and 52 connect the IPG 14 with the RA, the RV and the LV, respectively, through connections made in the IPG connector block 14. A remote indifferent can electrode [22] may be formed as part of the outer surface of the housing [20] of the IPG 14. [Alternatively]In addition, a plurality of [such] electrodes 22, 24 and 26 may be formed in an array on the outer surface of the housing [20] or the connector block 14 in a manner described in commonly assigned U.S. Patent No. 5,331,966. These electrodes may be selectively employed to measure the QRS duration as described further below.

The paragraph beginning at page 11, line 26 has been amended as follows:

Any of the housing electrodes may be designated as a remote indifferent can electrode. For discussion purposes, this indifferent can electrode will be referred to hereinafter as "IND_CAN electrode [22]20". This electrode may be employed in unipolar pacing and sensing combinations with a pace/sense electrode of one or more of the depicted leads 16, 32 and 52. The depicted positions of the pace/sense electrodes in or about the right and left heart chambers are also merely exemplary. Other leads and pace/sense electrodes may be used instead of the depicted leads and pace/sense electrodes that are

adapted to be placed at electrode sites on or in or relative to the RA, LA, RV and LV.

The paragraph beginning at page 12, line 3 has been amended as follows:

The depicted bipolar endocardial RA lead 16 is passed through a vein into the RA chamber of the heart 10, and the distal end of the RA lead 16 is attached to the RA wall by an attachment mechanism 17. The bipolar endocardial RA lead 16 is formed with an in-line connector 13 fitting into a bipolar bore of IPG connector block 12 that is coupled to a pair of electrically insulated conductors within lead body 15 and connected with distal tip RA pace/sense electrode 19 and proximal ring RA pace/sense electrode 21. Delivery of atrial pace pulses and sensing of atrial sense events is effected between the distal tip RA pace/sense electrode 19 and proximal ring RA pace/sense electrode 21, wherein the proximal ring RA pace/sense electrode 21 functions as an indifferent electrode (IND_RA). Alternatively, a unipolar endocardial RA lead could be substituted for the depicted bipolar endocardial RA lead 16 and be employed with the IND_CAN electrode [22]20. Or, one of the distal tip RA pace/sense electrode 19 and proximal ring RA pace/sense electrode 21 can be employed with the IND_CAN electrode [22]20 for unipolar pacing and/or sensing.

The paragraph beginning at page 12, line 16 has been amended as follows:

Bipolar, endocardial RV lead 32 is passed through the vein and the RA chamber of the heart 10 and into the RV where its distal ring and tip RV pace/sense electrodes 38 and 40 are fixed in place in the apex by a conventional distal attachment mechanism 41. The RV lead 32 is formed with an in-line connector 34 fitting into a bipolar bore of IPG connector block 12 that is coupled to a pair of electrically insulated conductors within lead body 36 and connected with distal tip RV pace/sense electrode 40 and proximal ring RV pace/sense electrode 38, wherein the proximal ring RV pace/sense electrode 38 functions as an indifferent electrode (IND_RV). Alternatively, a unipolar endocardial RV lead could be substituted for the depicted bipolar endocardial RV lead 32 and be

employed with the IND_CAN electrode [22]20. Or, one of the distal tip RV pace/sense electrode 40 and proximal ring RV pace/sense electrode 38 can be employed with the IND_CAN electrode [22]20 for unipolar pacing and/or sensing.

The paragraph beginning at page 13, line 12 has been amended as follows:

In this case, the CS lead body 56 would encase four electrically insulated lead conductors extending proximally from the more proximal LA CS pace/sense electrode(s) and terminating in a dual bipolar connector 54. The LV CS lead body would be smaller between the LA CS pace/sense electrodes 28 and 30 and the LV CS pace/sense electrodes 48 and 50. It will be understood that LV CS lead 52 could bear a single LA CS pace/sense electrode 28 and/or a single LV CS pace/sense electrode 50 that are paired with the IND_CAN electrode [22]20 or the ring electrodes 21 and 38, respectively for pacing and sensing in the LA and LV, respectively.

The paragraph beginning at page 17, line 6 has been amended as follows:

The output amplifiers circuit 340 includes switching circuits for coupling selected pace/sense electrode pairs from among the lead conductors and the IND_CAN electrode [22]20 to the RA pace pulse generator (and LA pace pulse generator if provided), RV pace pulse generator and LV pace pulse generator. Pace/sense electrode pair selection and control circuit 350 selects lead conductors and associated pace/sense electrode pairs to be coupled with the atrial and ventricular output amplifiers within output amplifiers circuit 340 for accomplishing RA, LA, RV and LV pacing.

The paragraph beginning at page 17, line 23 has been amended as follows:

The sense amplifiers in sense amplifiers circuit 360 are uncoupled from the sense electrodes during the blanking periods before, during, and after delivery of a pace pulse to any of the pace/sense electrodes of the pacing system to avoid saturation of the sense amplifiers. The sense amplifiers circuit 360 includes blanking circuits for uncoupling the selected pairs of the lead

conductors and the IND_CAN electrode [22]20 from the inputs of the RA sense amplifier (and LA sense amplifier if provided), RV sense amplifier and LV sense amplifier during the ABP, PVABP and VBP. The sense amplifiers circuit 360 also includes switching circuits for coupling selected sense electrode lead conductors and the IND_CAN electrode [22]20 to the RA sense amplifier (and LA sense amplifier if provided), RV sense amplifier and LV sense amplifier. Again, sense electrode selection and control circuit 350 selects conductors and associated sense electrode pairs to be coupled with the atrial and ventricular sense amplifiers within the output amplifiers circuit 340 and sense amplifiers circuit 360 for accomplishing RA, LA, RV and LV sensing along desired unipolar and bipolar sensing vectors.

The paragraph beginning at page 23, line 4 has been amended as follows:

FIG. 6A-6B is a flow chart illustrating the steps S114 and S132 of FIG. 4 for delivering ventricular pace pulses triggered by a ventricular sense event in step S108 during the time-out of an AV delay, or in step S124 during time-out of the V-A escape interval. It may be noted that these steps are optional, and may not be provided in some devices, or alternatively, may be designed to be programmably enabled/disabled. As noted above, the sensing of R-waves in the RV and LV can be accomplished by employing several RV-SENSE and LV-SENSE sensing axes or vectors and the trans-ventricular sensing vector. The selected vectors may include the bipolar RV-SENSE vector (RV sense electrodes 38 and 40), a unipolar RV-SENSE vector (RV tip sense electrode 40 and IND_CAN electrode [22]20), a unipolar LV-SENSE vector (LV sense electrode 50 and IND_CAN electrode [22]20), and a trans-ventricular, combined RV-SENSE and LV-SENSE vector (RV tip sense electrode 40 and LV sense electrode 50). The selection of the sensing vectors would depend upon heart condition and the selection of the pace pulse pathways.